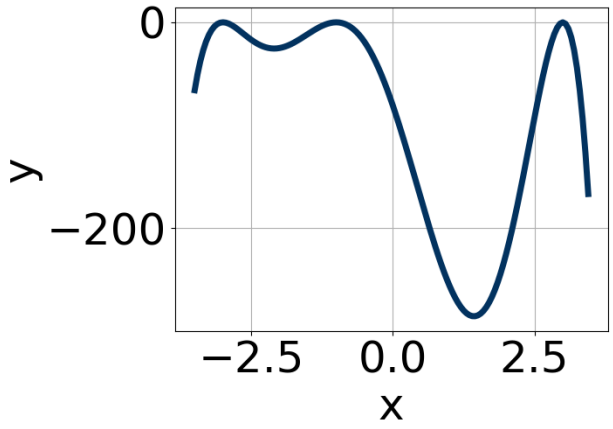
1. Which of the following equations *could* be of the graph presented below?



A. $-18(x+3)^6(x+1)^4(x-3)^8$

B. $12(x+3)^8(x+1)^4(x-3)^7$

C. $-7(x+3)^6(x+1)^{10}(x-3)^7$

D. $8(x+3)^6(x+1)^6(x-3)^6$

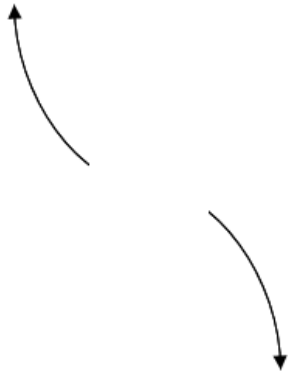
E. $-12(x+3)^{10}(x+1)^{11}(x-3)^5$

---

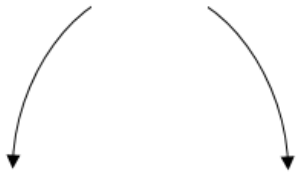
2. Describe the end behavior of the polynomial below.

$$f(x) = -9(x+8)^2(x-8)^5(x-6)^2(x+6)^3$$

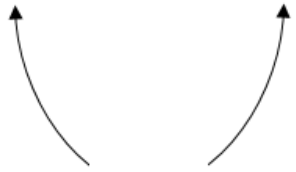
A.

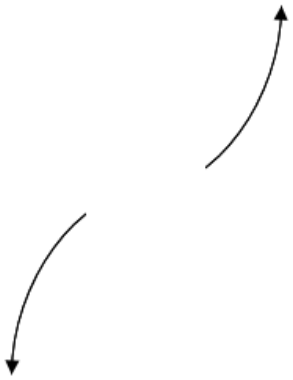


B.



C.



D. 

E. None of the above.

---

3. Construct the lowest-degree polynomial given the zeros below. Then, choose the intervals that contain the coefficients of the polynomial in the form $x^3 + bx^2 + cx + d$.

$$4 + 3i \text{ and } 1$$

A. $b \in [1, 2], c \in [-6, -4.35],$ and $d \in [3.48, 4.06]$

B. $b \in [1, 2], c \in [-4.24, -2.63],$ and $d \in [2.96, 3.37]$

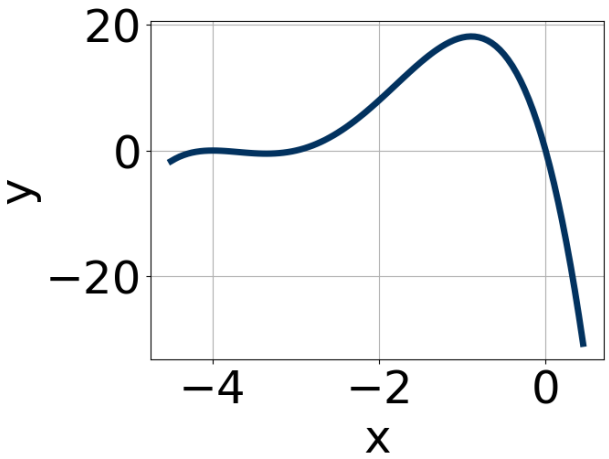
C. $b \in [-17, -7], c \in [31.51, 33.82],$ and $d \in [-25.2, -24.86]$

D. $b \in [8, 10], c \in [31.51, 33.82],$ and $d \in [24.44, 25.5]$

E. None of the above.

---

4. Which of the following equations *could* be of the graph presented below?



A. $-5x^5(x+4)^8(x+3)^7$

B. $-19x^6(x+4)^6(x+3)^7$

C. $-14x^{10}(x+4)^9(x+3)^5$

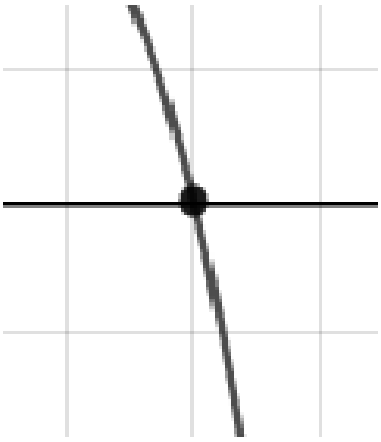
D. $10x^{11}(x+4)^8(x+3)^{10}$

E. $19x^{11}(x+4)^4(x+3)^7$

---

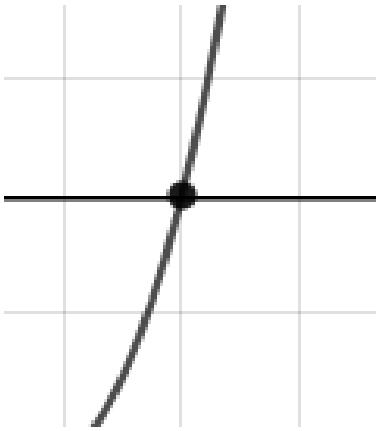
5. Describe the zero behavior of the zero $x = 8$ of the polynomial below.

$$f(x) = -9(x-6)^9(x+6)^6(x-8)^{12}(x+8)^9$$

A. 

B. 

C. 

D. 

E. None of the above.

---

6. Construct the lowest-degree polynomial given the zeros below. Then, choose the intervals that contain the coefficients of the polynomial in the form $ax^3 + bx^2 + cx + d$.

$$\frac{3}{2}, 5, \text{ and } \frac{-4}{3}$$

A. $a \in [0, 10], b \in [45, 52], c \in [97, 103],$ and $d \in [55, 64]$

B. $a \in [0, 10], b \in [-34, -27], c \in [-9, -4],$ and $d \in [55, 64]$

C. $a \in [0, 10], b \in [-34, -27], c \in [-9, -4],$ and $d \in [-66, -56]$

D. $a \in [0, 10], b \in [26, 37], c \in [-9, -4],$ and $d \in [-66, -56]$

E. $a \in [0, 10], b \in [-13, -7], c \in [-76, -68],$ and $d \in [-66, -56]$

---

7. Construct the lowest-degree polynomial given the zeros below. Then, choose the intervals that contain the coefficients of the polynomial in the form $x^3 + bx^2 + cx + d$.

$$-3 + 2i \text{ and } 2$$

A. $b \in [-5.5, -1.2], c \in [-3, 3],$ and $d \in [24, 27]$

B. $b \in [0.7, 1.5], c \in [-6, -3],$ and $d \in [0, 9]$

C. $b \in [3.8, 5.3], c \in [-3, 3],$ and $d \in [-32, -24]$

D. $b \in [0.7, 1.5], c \in [-3, 3],$ and $d \in [-10, -3]$

E. None of the above.

---

8. Construct the lowest-degree polynomial given the zeros below. Then, choose the intervals that contain the coefficients of the polynomial in the form $ax^3 + bx^2 + cx + d$.

$$\frac{-3}{5}, \frac{-7}{2}, \text{ and } \frac{-3}{2}$$

A. $a \in [15, 23], b \in [110, 119], c \in [165, 169],$ and $d \in [-64, -58]$

B. $a \in [15, 23], b \in [-117, -109], c \in [165, 169],$ and $d \in [-64, -58]$

C. $a \in [15, 23], b \in [110, 119], c \in [165, 169],$ and $d \in [54, 68]$

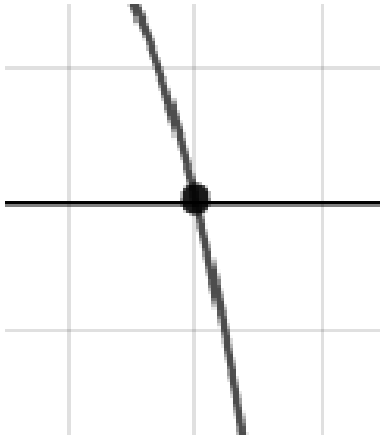
D. $a \in [15, 23], b \in [-53, -49], c \in [-85, -80],$ and $d \in [54, 68]$

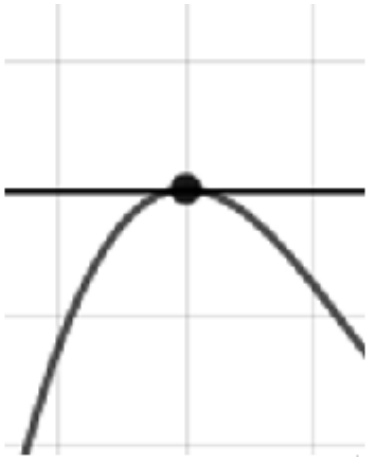
E. $a \in [15, 23], b \in [88, 93], c \in [36, 51],$ and $d \in [-64, -58]$

---

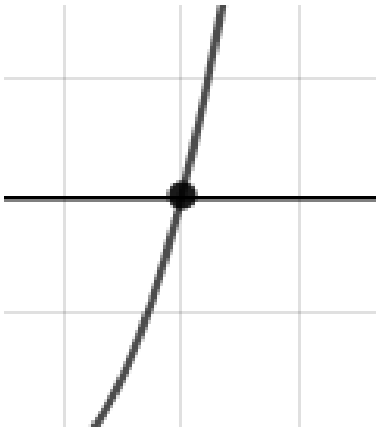
9. Describe the zero behavior of the zero $x = 7$ of the polynomial below.

$$f(x) = 2(x + 7)^7(x - 7)^{10}(x - 3)^4(x + 3)^8$$

A. 

B. 

C. 

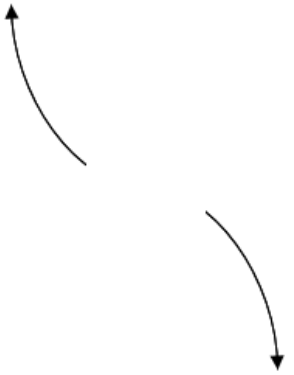
D. 

E. None of the above.

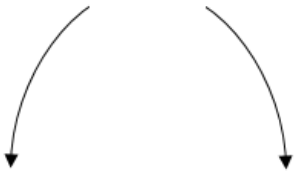
---

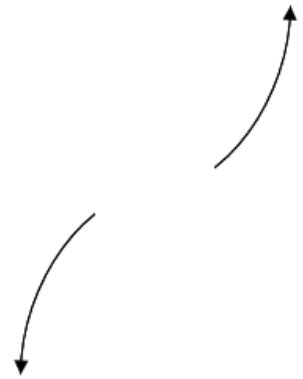
10. Describe the end behavior of the polynomial below.

$$f(x) = -3(x+4)^3(x-4)^6(x-5)^5(x+5)^7$$

A. 

C. 

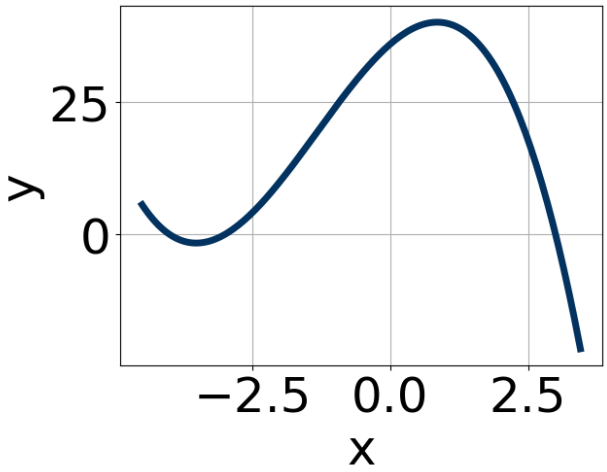
B. 

D. 

E. None of the above.

---

11. Which of the following equations *could* be of the graph presented below?



A. $-20(x-3)^6(x+4)^{11}(x+3)^5$

B. $-3(x-3)^7(x+4)^9(x+3)^{11}$

C. $6(x-3)^4(x+4)^{11}(x+3)^9$

D. $-3(x-3)^4(x+4)^8(x+3)^9$

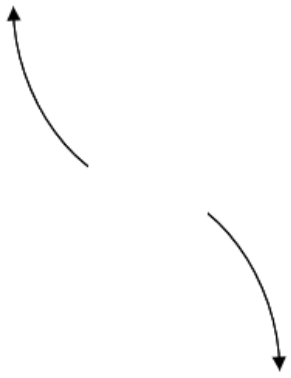
E. $18(x-3)^5(x+4)^5(x+3)^{11}$

---

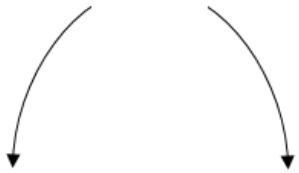
12. Describe the end behavior of the polynomial below.

$$f(x) = 6(x+4)^5(x-4)^6(x-3)^4(x+3)^5$$

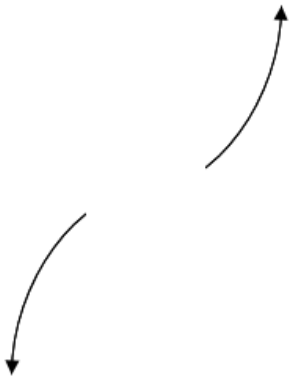
A.



B.



C.

D. 

E. None of the above.

---

13. Construct the lowest-degree polynomial given the zeros below. Then, choose the intervals that contain the coefficients of the polynomial in the form $x^3 + bx^2 + cx + d$.

$$-5 + 5i \text{ and } -3$$

A. $b \in [-1, 9], c \in [-8, 1],$ and $d \in [-15, -11]$

B. $b \in [11, 16], c \in [80, 82],$ and $d \in [147, 158]$

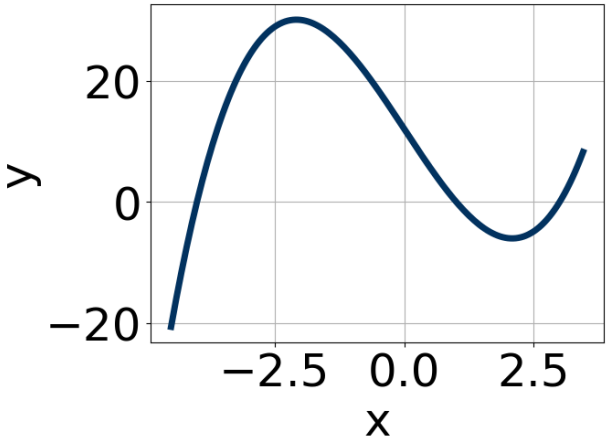
C. $b \in [-1, 9], c \in [7, 11],$ and $d \in [11, 19]$

D. $b \in [-19, -12], c \in [80, 82],$ and $d \in [-158, -146]$

E. None of the above.

---

14. Which of the following equations *could* be of the graph presented below?



A. $3(x-3)^4(x+4)^8(x-1)^5$

B. $-12(x-3)^4(x+4)^5(x-1)^7$

C. $9(x-3)^7(x+4)^{11}(x-1)^{11}$

D. $-12(x-3)^9(x+4)^{11}(x-1)^5$

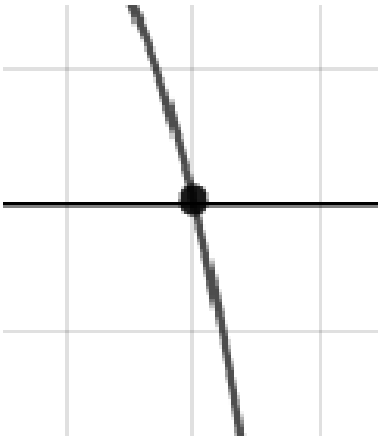
E. $10(x-3)^6(x+4)^{11}(x-1)^7$

---

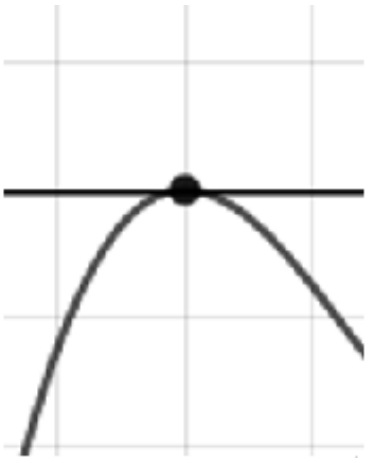
15. Describe the zero behavior of the zero $x=-8$ of the polynomial below.

$$f(x)=9(x+2)^{11}(x-2)^7(x+8)^7(x-8)^6$$

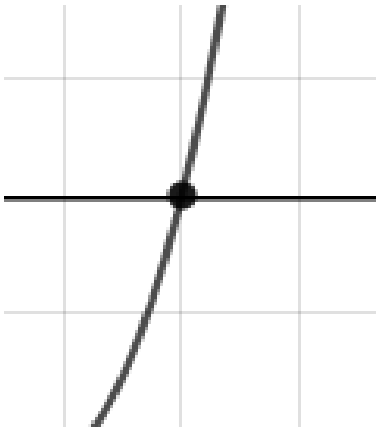
A.



B.



C. 

D. 

E. None of the above.

---

16. Construct the lowest-degree polynomial given the zeros below. Then, choose the intervals that contain the coefficients of the polynomial in the form $ax^3 + bx^2 + cx + d$.

$$\frac{5}{2}, \frac{-1}{3}, \text{ and } \frac{-2}{3}$$

A. $a \in [17, 23], b \in [19, 28], c \in [-45, -36],$ and $d \in [8, 11]$

B. $a \in [17, 23], b \in [-27, -24], c \in [-45, -36],$ and $d \in [-17, -9]$

C. $a \in [17, 23], b \in [50, 54], c \in [3, 12],$ and $d \in [-17, -9]$

D. $a \in [17, 23], b \in [58, 75], c \in [44, 53],$ and $d \in [8, 11]$

E. $a \in [17, 23], b \in [-27, -24], c \in [-45, -36],$ and $d \in [8, 11]$

---

17. Construct the lowest-degree polynomial given the zeros below. Then, choose the intervals that contain the coefficients of the polynomial in the form $x^3 + bx^2 + cx + d$.

$$4 + 5i \text{ and } -2$$

A. $b \in [1, 3], c \in [-4.5, -2.7],$ and $d \in [-10.1, -9.4]$

B. $b \in [1, 3], c \in [-2.53, -1.56],$ and $d \in [-8.9, -6.6]$

C. $b \in [6, 11], c \in [22.96, 25.33],$ and $d \in [-83.9, -75.9]$

D. $b \in [-7, -3], c \in [22.96, 25.33]$, and $d \in [80.5, 82.2]$

E. None of the above.

---

18. Construct the lowest-degree polynomial given the zeros below. Then, choose the intervals that contain the coefficients of the polynomial in the form $ax^3 + bx^2 + cx + d$.

$$\frac{7}{5}, \frac{-1}{4}, \text{ and } \frac{2}{5}$$

A. $a \in [97, 103], b \in [75, 77], c \in [-81, -77]$, and $d \in [6, 19]$

B. $a \in [97, 103], b \in [-163, -151], c \in [5, 14]$, and $d \in [-14, -13]$

C. $a \in [97, 103], b \in [-163, -151], c \in [5, 14]$, and $d \in [6, 19]$

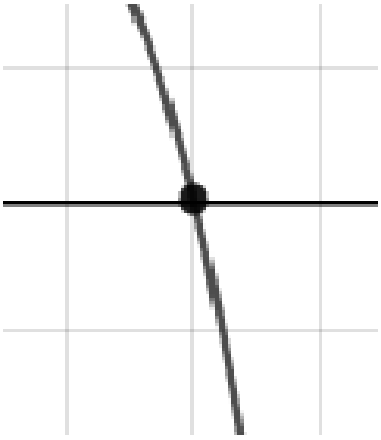
D. $a \in [97, 103], b \in [147, 156], c \in [5, 14]$, and $d \in [-14, -13]$

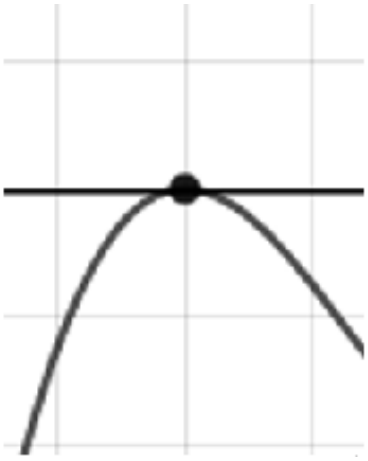
E. $a \in [97, 103], b \in [119, 127], c \in [-37, -25]$, and $d \in [-14, -13]$

---

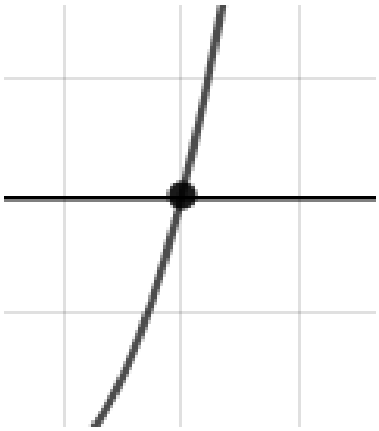
19. Describe the zero behavior of the zero $x = -6$ of the polynomial below.

$$f(x) = 9(x-6)^5(x+6)^{10}(x-9)^7(x+9)^{11}$$

A. 

B. 

C. 

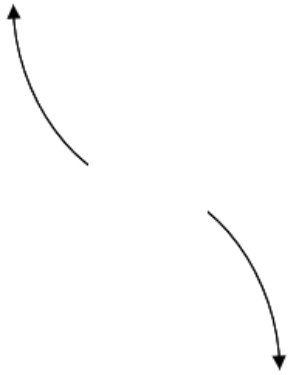
D. 

E. None of the above.

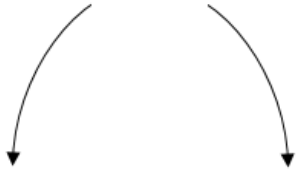
---

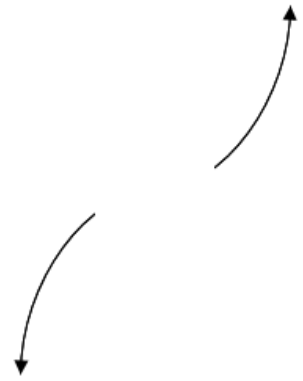
20. Describe the end behavior of the polynomial below.

$$f(x) = -8(x-2)^4(x+2)^5(x+9)^5(x-9)^6$$

A. 

C. 

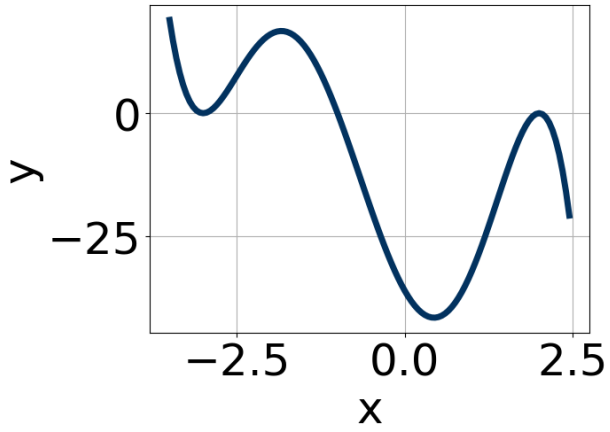
B. 

D. 

E. None of the above.

---

21. Which of the following equations *could* be of the graph presented below?



A. $19(x-2)^{10}(x+3)^{6}(x+1)^{8}$

B. $-18(x-2)^{10}(x+3)^{6}(x+1)^{11}$

C. $-19(x-2)^{8}(x+3)^{9}(x+1)^{10}$

D. $13(x-2)^{10}(x+3)^{10}(x+1)^{5}$

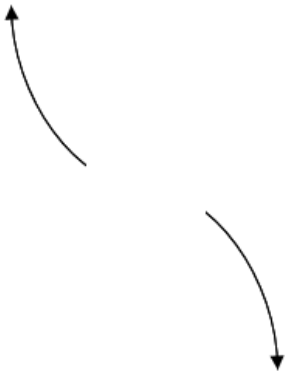
E. $-4(x-2)^{10}(x+3)^{5}(x+1)^{5}$

---

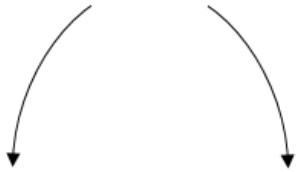
22. Describe the end behavior of the polynomial below.

$$f(x) = 4(x+6)^{4}(x-6)^{9}(x+9)^{3}(x-9)^{3}$$

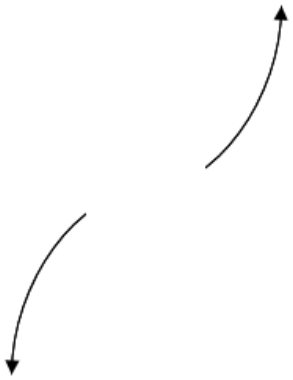
A.



B.



C.

D. 

E. None of the above.

---

23. Construct the lowest-degree polynomial given the zeros below. Then, choose the intervals that contain the coefficients of the polynomial in the form $x^3 + bx^2 + cx + d$.

$$-3 - 5i \text{ and } -4$$

A. $b \in [-1, 5], c \in [8, 9.7],$ and $d \in [16, 22]$

B. $b \in [-1, 5], c \in [6.7, 8.6],$ and $d \in [10, 14]$

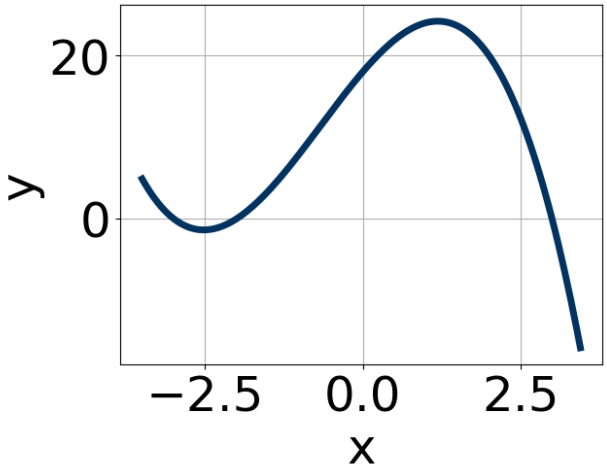
C. $b \in [-15, -8], c \in [56.1, 58.3],$ and $d \in [-143, -134]$

D. $b \in [6, 14], c \in [56.1, 58.3],$ and $d \in [130, 141]$

E. None of the above.

---

24. Which of the following equations *could* be of the graph presented below?



A. $7(x+2)^6(x+3)^{11}(x-3)^7$

B. $-10(x+2)^{10}(x+3)^9(x-3)^9$

C. $11(x+2)^9(x+3)^9(x-3)^9$

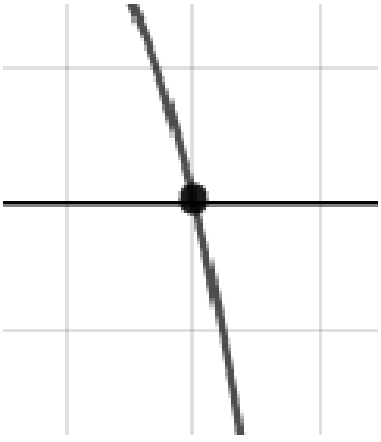
D. $-2(x+2)^9(x+3)^{11}(x-3)^5$

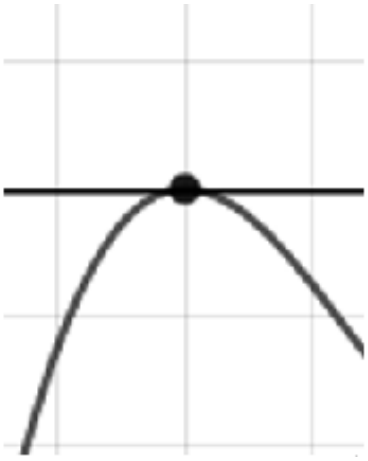
E. $-5(x+2)^4(x+3)^8(x-3)^9$

---

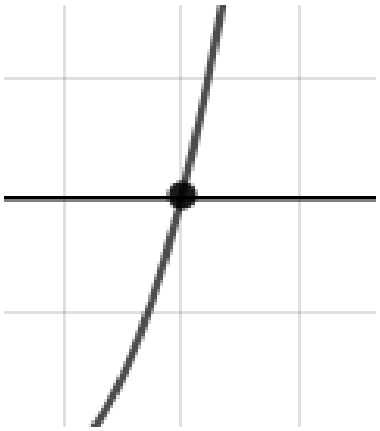
25. Describe the zero behavior of the zero $x = -6$ of the polynomial below.

$$f(x) = -9(x-6)^9(x+6)^{10}(x+2)^9(x-2)^{12}$$

A. 

B. 

C. 

D. 

E. None of the above.

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26. Construct the lowest-degree polynomial given the zeros below. Then, choose the intervals that contain the coefficients of the polynomial in the form $ax^3 + bx^2 + cx + d$.

$$-2, \frac{-7}{3}, \text{ and } \frac{3}{2}$$

A. $a \in [5, 11], b \in [16, 20], c \in [-14, -9],$ and $d \in [40, 47]$

B. $a \in [5, 11], b \in [-12, -2], c \in [-33, -27],$ and $d \in [40, 47]$

C. $a \in [5, 11], b \in [-43, -32], c \in [63, 68],$ and $d \in [-47, -37]$

D. $a \in [5, 11], b \in [-21, -14], c \in [-14, -9],$ and $d \in [40, 47]$

E. $a \in [5, 11], b \in [16, 20], c \in [-14, -9],$ and $d \in [-47, -37]$

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27. Construct the lowest-degree polynomial given the zeros below. Then, choose the intervals that contain the coefficients of the polynomial in the form $x^3 + bx^2 + cx + d$.

$$-4 - 3i \text{ and } -3$$

A. $b \in [11, 19], c \in [48.36, 49.78],$ and $d \in [72.6, 77.1]$

B. $b \in [0, 7], c \in [4.02, 6.83],$ and $d \in [7.9, 9.5]$

C. $b \in [0, 7], c \in [6.29, 9.06],$ and $d \in [11.8, 14.7]$

D. $b \in [-16, -10], c \in [48.36, 49.78],$ and $d \in [-76, -71.8]$

E. None of the above.

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28. Construct the lowest-degree polynomial given the zeros below. Then, choose the intervals that contain the coefficients of the polynomial in the form $ax^3 + bx^2 + cx + d$.

$$\frac{-7}{5}, \frac{-1}{4}, \text{ and } \frac{3}{5}$$

A. $a \in [100, 104], b \in [-230, -224], c \in [129, 136],$ and $d \in [-21, -15]$

B. $a \in [100, 104], b \in [-177, -171], c \in [30, 38],$ and $d \in [20, 32]$

C. $a \in [100, 104], b \in [-112, -104], c \in [-65, -60],$ and $d \in [20, 32]$

D. $a \in [100, 104], b \in [103, 115], c \in [-65, -60],$ and $d \in [20, 32]$

E. $a \in [100, 104], b \in [103, 115], c \in [-65, -60],$ and $d \in [-21, -15]$

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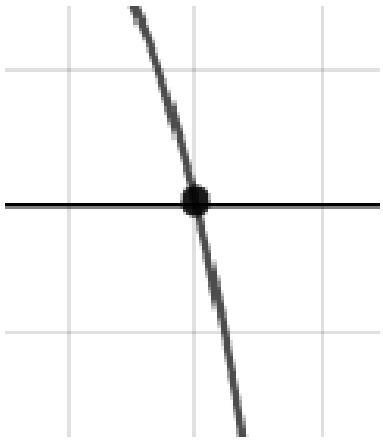
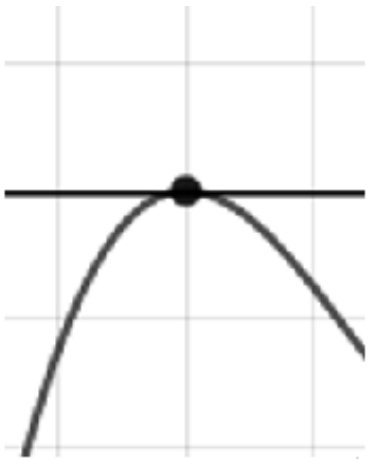
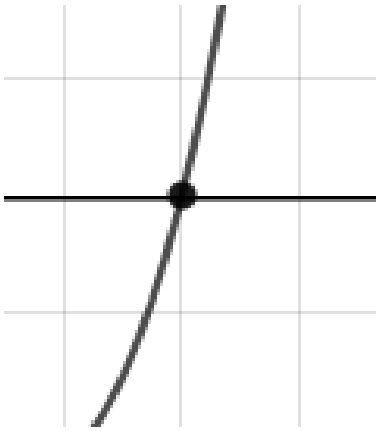
29. Describe the zero behavior of the zero $x = 7$ of the polynomial below.

$$f(x) = -7(x-3)^{11}(x+3)^9(x-7)^{14}(x+7)^9$$

A. 

B. 

C. 

D. 

E. None of the above.

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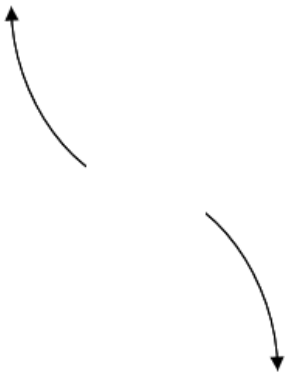
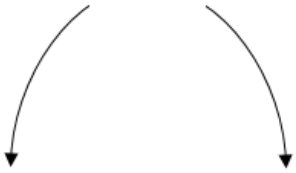
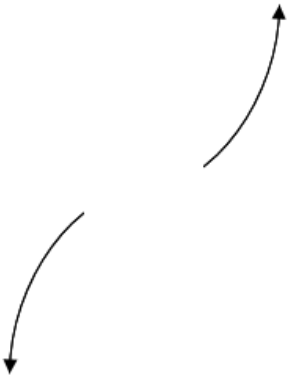
30. Describe the end behavior of the polynomial below.

$$f(x) = -3(x+9)^5(x-9)^8(x-3)^2(x+3)^3$$

A. 

C. 

B. 

D. 

E. None of the above.
